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HAWKS AND HAWKING.*

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It has been said that the history of animals interests us in proportion as they are of service to us, or are the means of providing us with amusement. Hawks are capable of both, and on this account, therefore, may be said to deserve a greater share of attention than is generally accorded to them at the present day. We are all hunters by nature. We have an inherent passion for chasing and taking wild animals, and feel an inward satisfaction in outwitting their natural instinct which prompts them to fly from us, by our reason which is exercised by observation of their habits. Our ancestors were hunters through necessity. They had to chase and kill wild animals in order to live. They either pursued them with hounds till they were brought to bay, and then slew them with sword or spear, or stalked them in the forest, and killed them with bow and arrow, or with a sling. The larger animals were taken in nets, pitfalls, or other devices, and succumbed to the united strength of numerous assailants.

Birds which in their own element, the air, evaded pursuit, were taken either in snares or with birdlime, the use of which appears to have been known at a very early date. By degrees, it would seem, from continued observation of their predatory habits, hunters conceived the idea of snaring birds of prey and of training them to be of use to them in the chase; in other words, they instituted the art of Falconry or Hawking.

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* Being the substance of one of the 'Davis Lectures,' delivered at the Zoological Gardens, June 24th, 1880.

The origin of this art it is now impossible to discover. From the earliest times of which history takes cognizance people of all nations, but more particularly those of eastern origin, have practised the sport; and we may form some idea of its antiquity from Sir A. H. Layard's discovery of a bas-relief amongst the ruins of Khorsabad, in which a falconer is represented carrying a hawk upon his wrist. From this it is to be inferred that hawking was practised there some 1700 years B. C. In China it was known even at an earlier date than this; for in an old Japanese work, of which a French translation appeared at the beginning of the present century,* it is stated that Falcons were amongst the presents made to princes in the time of the Hia dynasty, which commenced in the year 2205 B. C. The records of King Wen Wang, who reigned over the province of Hunan between 689 and 675 B. C. show that in his day Hawking was much in vogue there.† In Japan it seems to have been known many centuries before the Christian era, and probably at an equally early date in India, Arabia, Persia, and Syria.

From the East it was introduced into Europe, although the precise date of such introduction is unknown; but from the allusions made to the sport by Aristotle,‡ Pliny,§ Ælian,|| Martial,¶ and Oppian,** brief and even vague though they be, we may infer that Hawking was known to, if not practised by, Europeans at least three centuries before the Christian era.

John of Salisbury, who died in 1182, discussing the question of the origin of Falconry in Europe,†† arrived at the conclusion that it was introduced into Greece by Ulysses after the siege of Troy, an opinion which has been endorsed by several subsequent writers. According to Von Hammer,‡‡ however, the Turks were the first masters of the art in Europe, and imparted it to the

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* 'Topographie de la Province Kawatsi,' par Akizato Rito, avec des planches faites par Tokei, peintre de Tanba-no. 6 vols. 8vo, 1801.

† The authority for this statement is an ancient Chinese MS. quoted by Schlegel, in his 'Traité de Fauconnerie.'

‡ Hist. Anim. i. lib. 9, cap. 36.

§ Hist. Nat. lib. 7, cap. 10.

|| De Nat. An. lib. 2, cap. 42.

¶ Epigr. lib. 14, no. 216.

** Cynegeticon, lib. 1, 62—66.

†† 'De nugis curialium, et vestigiis philosophorum,' lib. 1, cap. 4.

‡‡ Falknerklee, p. xx., quoted by Schlegel, *op. cit.*

Persians, who in turn instructed the Greeks and Arabs. This view receives some confirmation from a recently published French translation of an Arabic MS. of the 10th century on Hunting and Hawking, which is now before me.* In this work it is stated that the first falconer, according to an Arabic tradition, was a King of Persia. During one of his excursions he was greatly interested in watching unobserved the actions of a wild hawk. He saw it perch upon a bough "with the air of a sovereign upon his throne," where it watched for an opportunity to seize a passing bird. He saw it at last take one, and having made a meal of it, fly down to the river, drink and bathe, and then return to its tree. He was struck with admiration at its majestic appearance, its wonderful patience, and its power over other birds, which it seemed to take by sovereignty of nature, and was seized with a desire to possess it. His fowlers gratified his inclination by snaring it. He caused it to be tied on a perch near him, and succeeded in taming it, learning many a lesson from observation of its good qualities. It was asserted, indeed, as a consequence, that this king, who was naturally of a violent disposition, became, through this lesson, a better administrator and a wiser sovereign. The Arabic writer from whom I quote remarks that "the *savans* of Greece pretend that it was in Greece that falcons were first trained, but Mohamed ben Mangali (the author) says, and is inclined to believe, that it was in Persia that the art of Falconry was invented."

It would be beside my present purpose, however, to discuss any further the question of origin, or to detail the development and spread of Falconry in countries beyond the British Islands. This would not only be a very considerable task, but it is to a great extent rendered unnecessary by the existence of Professor Schlegel's admirable folio work, 'Traité de Fauconnerie,' which is illustrated, by Mr. Wolf, with coloured plates of all the hawks used by falconers, and which should be consulted by everyone who takes an interest in this subject.

Although the precise date of the introduction of Hawking into England cannot now be ascertained, we know from several sources that it was practised by our ancestors in early Saxon times. In a letter addressed by King Ethelbert (A. D. 748—760) to St. Boniface, Archbishop of Mayence, who died in 755, the monarch asked him to send over two Falcons that would do to fly at the Crane, for, said he, "there are very few birds of use for this flight in our country," *i. e.*, Kent.*

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* 'Sid Mohamed el Mangali, Traité de Venerie, traduit de l'Arabe par Florian Pharaon.' Tiré à 300 exemplaires numérotés. Paris, 1800.

Asser, in his 'Life of Alfred the Great,' says of this king, "His felicity in hunting and hawking, as well as in all the other gifts of God, was really incomparable, as I myself have often seen." †

William of Malmsbury records much the same of Athelstan, who was extremely fond of Hawking, and procured his hawks from Wales. ‡ The same historian (lib. ii. cap. 13) thus describes Edward the Confessor's love of hunting and hawking:—"It was his chiefest delight to follow a pack of swift hounds in pursuit of their game, and to cheer them with his voice, or to attend the flights of hawks taught to pursue and catch their kindred birds. Every day after divine service he took the field, and spent his time in these beloved sports."

So general was the pastime in Saxon times that the monks of Abingdon found it necessary to procure a charter from King Kenulph to restrain the practice in order to prevent their lands from being trampled on.

Strutt gives an engraving from a MS. of the end of the 9th or beginning of the 10th century, representing a Saxon nobleman and his falconer with hawks on the bank of a river where a crane and wild ducks are feeding. Another drawing upon the same subject, with a little variation, occurs in a Saxon MS. of somewhat later date.

Every British chieftain kept a large number of hawks,§ and in the 10th century, as we gather from the Laws of Howel Dha, Hawking was a favourite sport with the Britons in Wales. The Penhebogydd, or Master of the Hawks, was the fourth officer in rank and dignity, and sat in the fourth place from his sovereign at the royal table. He was permitted to drink no more than three times, lest he should neglect his birds from intoxication; and when more than usually successful, the prince was obliged by law and custom to rise up and receive him as he entered the hall, and sometimes to hold his stirrup as he alighted from his horse. Spelman relates that a British chief named Gaufredus, A. D. 1008, was struck on the head with a stone and killed by an angry woman, because his hawk had seized one of her fowls: "*quod accipiter ejus mulieris gallinam invaserat.*"

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* Epistolæ Sancte Bonifacii in Max. Bibl. patr., vol. xiii., Epist. xl., p. 85. See also Chronicum Saxonicum, Ed. Gibson (1692), p. 56; 2, and p. 60, 1.

† See also Florence of Worcester, Chronicon, ann. 871, p. 310; and Spelman, 'Glossarium Archaiologicum,' pp. 6, 7.

‡ It is recorded by this chronicler that Athelstan required of the Welsh "*Volucres quæ aliarum avium prædam per inane venari noscerent.*"

§ A passage in Ossian (i., p. 115) refers to a negotiation of peace by the proffer of 100 managed steeds, 100 foreign captives, and 100 hawks with fluttering wings that fly across the sky.

Hawking was pursued by all the Norman princes with the greatest enthusiasm. In those days a person of rank seldom stirred out without a hawk upon his hand. In old paintings and tapestry this was a sign of nobility, a good illustration of which is furnished by the celebrated Bayeux tapestry, which is preserved in the cathedral of Bayeux, in Normandy, and is there known as "la toilette du Duc Guillaume." It is 200 feet long, and about two feet six wide, and is said to be the work of Queen Matilda, the wife of the Conqueror. It represents the departure of Harold for Normandy, and the conquest of England by William the Conqueror. Harold and Guy Comte de Ponthieu are represented each carrying a Sparrowhawk on the wrist.*

From the time of Henry I., that is to say, from the commencement of the 12th century, and during many subsequent reigns, offences against the crown were often punished by the infliction of a fine of so many hawks;† prisoners were ransomed on similar terms;‡ and lands were held of the king by the tenure of finding annually one or more falcons, or of providing for their keep.§ Stringent laws were passed, making it felony to steal a trained hawk, and subjecting offenders in this respect to fine and imprisonment. It was even made illegal to take the eggs of any falcon or hawk, and in the reign of Henry VII. things came to such a pass, that, without the king's permission, no one could even fly a hawk that had been bred in England, but if he wanted one was obliged to import it from abroad.* Concerning the prices paid for hawks formerly, abundant information may be found in Court Rolls, Privy Purse Expenses, and various Household Books, from which sources of information also may be learnt the value, at various periods, of hawks' hoods and bells, falconers' wages, and other expenses relating to the sport.†

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* Lancelot, 'Explication de la tapisserie de Bayeux, dans les Mémoires de l'Acad. des Inscriptions et Belles Lettres,' Paris, vi. p. 739; and viii. p. 602.

† In the reign of Stephen, Outi of Lincoln was fined 100 Norway hawks, and as many Jerfalcons, of which four of the former and six of the latter were to be white. Mag. Rot. 5 Steph. Rot. 12 a. Madox, Hist. and Antiq. of the Exchequer, vol. i. p. 273.

‡ In 1212, during one of the Welsh campaigns of King John against Llewellyn ap Jorwerth, Prince of North Wales, the king, passing the river of Conway, encamped by its side, and sent part of his army, with guides of the country, to burn Bangor. This they did, and, amongst other prisoners, took Rotpart the Bishop, who was afterwards ransomed for two hundred hawks!

§ Blount, 'Ancient Tenures,' *passim.*

Our kings frequently received presents of hawks from foreign potentates, and often made similar presents themselves. Edward I., in 1276, received eight grey and three white Jerfalcons from the King of Norway,‡ some of which he seems to have forwarded to the King of Castille, a letter of his to that sovereign being extant in which he says:—"We send you four grey Jerfalcons, two of which are trained to fly at the Crane and Heron; as to the other two, you can use them as you think best. Having already lost nine white falcons we have none of these at present to offer. Meanwhile we have sent some of our people to Norway to fetch some."§

The Norwegian hawks were early celebrated for their quality and beautiful plumage. They are mentioned in the old romance of 'Sir Tristram' as being anciently objects of commerce and importation:—

"Ther com a schip from Norway
To Sir Rohandes hold,
With hawkes white and grey
And panes fair y fold."||

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* The following are amongst the principal statutes relating to Hawks and Hawking:—Hen. III. Carta de Foresta, cap. xi.; 34 Edw. III. c. 22; 37 Edw. III. c. 19; 11 Hen. VII. c. 17; 31 Hen. VIII. c. 12; 5 Eliz. c. 21; 23 Eliz. c. 10 7 James I. c. 11.

† See the Rotulus Misæ, 14 John; the Originalia Rolls, 35 Edw. III.; the Privy Purse Expenses of Edward IV., Hen. VII., and Hen. VIII.; Issues of the Exchequer, James I; Duke of Buckingham's Household Book, 1507; the Northumberland Household Book, 1512; the Household Books of the L'Estranges of Hunstanton, 1520; and of Squire Kytson, of Hengrave, Co. Suffolk, 1572; and of Lord North, 1575. In his 'History of Agriculture and Prices in England' (vol. ii. p. 566), Prof. Thorold Rogers quotes the prices given for hawks in various parts of the country during the reigns of Henry III. and Edward I.; and in my 'Ornithology of Shakespeare' (pp. 77—82) I have given similar quotations of prices in Shakespeare's day.

‡ Thorkelin, Analecta Hist. Regni Norwegici, p. 158.

§ Rymer, 'Fœdera,' i. p. 186 (3rd ed.)

|| 'Sir Tristram,' fytte 1, xxviii. (ed. 1833).

Their value may be inferred from the fact that in this romance twenty shillings is staked in a game of chess against one hawk; and a further testimony of their value is given by Olaus Magnus, who states that the white ones were never shot at by the inhabitants, but were considered sacred, unless they did too much hurt and rapine.*

The practice of sending presents of hawks to the English court was continued during many reigns. John Chamberlain, in a letter to Sir Dudley Carleton, dated 15th November, 1617, relates how the Muscovian ambassador had an audience of the king, and brought divers presents of furs, estimated at better than £6000, and divers hawks with coats or coverings of ermison satin and other colours, embroidered with pearl.†

Again, Pepys, describing the entry into London of the Russian ambassador, 22nd November, 1662, writes:—"I could not see the ambassador in his coach; but his attendants in their habits and fur caps very handsome comely men, and most of them with hawks upon their fists to present to the King. . . . The King took two or three hawks upon his fist, having a glove on wrought with gold, given him for the purpose."

The King of Denmark sent Iceland Falcons to the court of Great Britain between the years 1699 and 1703, and to the Prince of Wales from 1741 to 1745.

Did space permit, a long account might be furnished of the doings of many of our kings in the hawking-field; but it must suffice if we select only a few illustrations.

In October, 1172, Henry II. was at Pembroke, South Wales, *en route* for Ireland, where, says Giraldus Cambrensis, he amused himself with the sport of hawking. He chanced to espy a noble falcon perched on a crag, and, making a circuit round the rock, he let loose upon it a large high-bred Norway hawk, which he carried on his left wrist. The falcon, though its flight was at first slower than the other bird's, having at last mounted above it, became in turn the assailant, and, stooping from aloft with great fury on the Norway hawk, laid it dead at the king's feet. From that time, it is said, the king used to send every year, in the proper season, for young falcons from the cliffs of South Wales, for in all his lands he could not find better or more noble hawks.

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* Ol. Mag. Hist. Goth. Angl. 1658, p. 200.

† 'Court and Times of James I.' vol. ii. p. 54.

Richard Cœur de Lion, while in the Holy Land, amused himself with hawking at Jaffa, in the plain of Sharon; and it is related of him that he sent an ambassador in vain to Melik el Aadil to try and procure some fowls for the hawks which he had brought with him from England, and which he desired to present to the Sultan. On another occasion, while passing through Dalmatia, he carried off a falcon which he saw in one of the villages, and, on refusing to give it up, was attacked so furiously by the villagers that it was with great difficulty, and only by valiantly defending himself, that he managed to make his escape.

King John used to send to Ireland for his hawks, amongst other places to Carrickfergus, Co. Antrim,* and was especially fond of a flight at the Crane with Jerfalcons, which he received from Philip, King of Norway. He used to hawk in Dorsetshire and Somersetshire, as appears by entries in the Court Rolls of payments of the expenses of the journeys. Here is an extract from the 'Rotulus Misæ,' 1212—13:—

> "On Wednesday, the Feast of the Innocents [Dec. 28th], at Eiswell, alms contributed, to buy food for 350 paupers, by the King, who proceeded to capture and took 7 Cranes, with his Hawks, for each of which he feasted 50 paupers, and every one of them had one penny . . . . summa . . 29s. 2d."

Again:—

> "On Wednesday next following the Purification at Limbagam, as alms to 100 paupers whom the King fed, as he went with his Gerfalcons to capture Cranes, and having taken 9 Cranes, he commanded the aforesaid paupers to be fed with bread, meat, and ale to the amount of . . . . 13s. 4d."

These entries serve not only to illustrate the history of Hawking in England, but are interesting as proving the former existence of the Crane in this country in sufficient numbers to be flown at when required. Nor are these exceptional instances. In the Wardrobe Accounts of King Edward I., preserved in the British Museum (Add. MSS., No. 7965; Ed. I., 1297-8) is the following entry:—

> "Jan. 5. To Alexander Coo, the King's falconer, for presenting to the King 3 Cranes taken in Cambridgeshire by the Gerfalcons of Sir Geoffrey de Hauville . . . . 6s. 8d."

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* *Cf.* Rotulus Misæ Anno Regis Johannis quarto decimi, A.D. 1212-13.

When Edward III. invaded France, he had with him, according to Froissart, thirty falconers, and every day he either hunted or went to the river for the purpose of hawking, as his fancy inclined him. A curious description of a hawk's perch of this period, which a lady had put up at the head of her bed and covered with blue velvet, is given by Chaucer, in "The Squire's Tale" (pt. ii.)

The Paston Letters, written in the reign of Edward IV., give us also a curious insight into the ways and doings of English falconers in the middle ages;* as do likewise the various Household Books and Privy Purse Expenses already referred to. Henry VII. used to import Goshawks from France, and gave as much as £4 for a single bird—a large sum in those days.†

Henry VIII.'s love of hawking is well known from the anecdote related of him in Hall's Chronicle (sub an. xvi.),‡ to the effect that being one day out hawking at Hitchin, in Hertfordshire, he was leaping a dyke with a hawking-pole, when it suddenly broke and the King was immersed head first in the mud and water, and might have lost his life, had not Edmund Moody, one of the falconers, immediately come to his assistance and dragged him out.

During the reign of Elizabeth hawking was much in vogue, particularly with the gentlemen of Cornwall and Devonshire, as we learn from Carew.§ Nichols, in his 'Progresses and Public Processions of Queen Elizabeth' (3 vols. 4to, 1788—1807), has given some interesting details concerning the Queen's participation in this and other field-sports, which want of space only prevents me from quoting.

James I., as is well known, was a most enthusiastic sportsman, and especially delighted in hawking, on which he spent considerable sums annually. As I have elsewhere given some account of his hawking establishment, and of his fishing with trained Cormorants,|| it will be unnecessary to repeat here the information which I have collected on the subject. I need only

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* See Prof. Newton's remarks on these letters, Appendix to Lubbock's 'Fauna of Norfolk,' 2nd ed. p. 224.

† Bentley, 'Excerpta Historica,' p. 95.

‡ See also 'Union of the two Noble and Illustre Famelies of Lancastre and Yorke,' 2nd ed. 1558, pl. cxxxix.

§ 'The Survey of Cornwall,' 1602, folio 24.

|| 'Transactions of the Norfolk and Norwich Naturalists' Society,' vol. iii. pp. 79—94; and Dickens's 'Dictionary of the Thames,' 1879. art. Ornithology.

refer to Falconry as practised in this reign for the purpose of contradicting a statement which has been copied over and over again appears in almost every book which contains a notice of the Peregrine Falcon. It was sanctioned by Yarrell in the first edition of his 'History of British Birds,'* and is repeated even in Prof. Schlegel's great work, that author apparently having had no opportunity of testing the accuracy of a story which he was obliged to quote secondhand. The statement in question is to the effect that hawks in former days were so valuable that, in the reign of James I., Sir Thomas Monson gave £1000 for a cast—*i. e.*, for two. This is not the fact, for if we trace the story back to the original narrator of it, Sir Antony Weldon, we find the truth to be that Sir Thomas Monson spent £1000 before he succeeded in getting a perfect cast of falcons for flying at the Kite. His words are:—"Sir Thomas Monson desired to have that flight [*i. e.*, at the Kite] in all exquisiteness, and to that end was at £1000 charge in Gos Faulcons† for that flight; in all that charge [*i. e.*, after going to all that expense] he never had but one cast would performe it, and those had killed nine Kites, never missed one."‡

These were the palmy days of Hawking, when the sovereigns on both sides of the channel (James I. and Louis XIII.) were enthusiastic falconers, giving every encouragement to the sport, when the species of hawk carried was indicative of the rank of the owner, and when the best books on the subject were written by English and French masters of the craft.§

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* In the fourth edition of this standard work, the Editor, with his usual acumen, has been careful to correct the mistake.

† The Gerfalcon was sometimes called Gos-falcon. It is related by Godscroft that at the Battle of Ancram Moor, in 1545, as the English and the Scots were approaching each other on a piece of low flat ground called "Panier-heugh,' a Heron, roused from the marshes by the tumult, soared away between the encountering armies. "Oh!" exclaimed Angus [Archibald Douglas, seventh Earl of Angus] "that I had here my white Gos-hawk, that we might all yoke at once!"

‡ 'The Court and Character of King James,' sm. 8vo, 1650, pp. 104, 105.

§ Amongst the English works printed about this time may be mentioned George Turberville's 'Book of Falconrie' (1575, 2nd ed. 1611); Gervase Markham's 'Gentleman's Academie' (1595) and 'Country Contentments' (1611); William Grindal's 'Hawking, Hunting, Fowling, and Fishing' (1596); Simon Latham's 'Faulconry, or the Falcon's Lure and Cure' (1615, 2nd book, 1618); and Edmund Bert's 'Treatise on Hawks and Hawking' (1619); while in France appeared the equally valuable and now scarce works of Jacques de Fouilloux, Jean de Franchières, Guillaume Tardif, and D'Arcussia. The last-named writer, who frequently accompanied Louis XIII. on his hawking excursions, has left us some capital descriptions of particular flights which he witnessed.

All the Stuarts were fond of hawking, and many anecdotes might be narrated illustrative of their participation in this sport. I will confine myself to three, which refer respectively to the reigns of James I., Charles I., and Charles II.

Sir Antony Weldon relates that the French king having sent over his falconer to show some flights at the Kite, "his master falconer lay long here, but could not kill one, ours being more magnanimous than the French kite." Sir Thomas Monson, the Earl of Pembroke, and other noblemen, being not unnaturally anxious to eclipse the Frenchmen, begged the king (James I.) to go out to Royston to see a flight. The king went, and a Kite was found and flown at; but, in the words of Sir Antony Weldon, "the Kite went to such a mountee, as all the field lost sight of Kite and Hawk and all, and neither Kite nor Hawk were either seen or heard of to this present, which made all the Court conjecture it a very ill omen."

There is a curious supplement to this story, which I can hardly forbear to mention. A writer in the 'Gentleman's Magazine' for 1793 states that in the beginning of September, 1792, a paragraph appeared in several newspapers mentioning that a hawk had been found at the Cape of Good Hope, and brought from thence by one of the India ships, having on its neck a gold collar on which were engraven the following words:—

> "This goodlie Hawk doth belong to his Most Excellent Majestie,
> James, Kinge of England. A. D. 1610."

The writer in question infers the authenticity of the inscription from Sir Antony Weldon's anecdote, and believes it must have been "the lost hawk"!*

Aubrey, in his 'Miscellanies' (p. 56, ed. 1784), says:—"When I was a freshman at Oxford, 1642, I was wont to go to Christ Church, to see King Charles I. at supper; where I once heard him say 'that as he was hawking in Scotland, he rode into the quarry, and found the covey of partridges falling upon the hawk;' and I do remember this expression further, *viz.*, 'and I will swear upon the book 'tis true.'" Aubrey adds, "When I came to my chamber I told this story to my tutor; said he, 'that covey was London"!*

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* I need not here repeat the criticism which I have ventured to make on this passage, and which will be found in the Trans. Norf. and Norw. Nat. Soc., vol. iii., pp. 87, 88.

The last anecdote I have to relate, on the authority of Sir Edward Sherborne, refers to Charles II. Not long before the death of this king, a Sparrowhawk escaped from the perch and pitched on one of the iron crowns of the White Tower, where, entangling its leash in the crown, it hung by the heels and died. Not long after another hawk pitched on one of the crowns. This was naturally regarded as a very ominous circumstance.

After the Restoration, hawking ceased to be popular, and gradually fell into disuetude, although from that time until the present it has never ceased to be practised by a few admirers of the old sport in various parts of the country. The last member of the Royal Family, I believe, who sent for or received hawks from abroad was Frederick Prince of Wales, son of George II. This prince used to occupy "the palace of Durdans," at Epsom, now the residence of the Earl of Rosebery, and used to hawk over the downs, where in 1825, according to the authors of a 'History of Epsom' published in that year, there was a spot still known as "the Hawkery."

The causes which have led to the decline of Falconry are many and various. The enclosure of waste lands, the drainage and cultivation of marshes, the great improvement in fire-arms of all kinds, and particularly the introduction of shot, have each in their way contributed to lessen the interest once so universally taken in this sport.† Fashion also, no doubt, has had a good deal to do with the decline of Hawking, for so soon as the reigning sovereign ceased to take an interest in the sport, the courtiers and their friends followed suit.

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* Although no falconer of my acquaintance can confirm the truth of this story, and the well-known timidity of the Partridge renders it well nigh incredible, instances have been known in which birds have come to the rescue of a companion attacked by a hawk. The late John Barr, one of the best professional falconers of modern times, told me that when he was falconer to the Champagne Hawking Club, (in 1866) he once flew at a Carrion Crow, one of a pair which they sighted, at Chalons, and his hawk struck it down. While the two were struggling on the ground and the crow was being killed, its companion came to the rescue, and darting down pecked at the hawk, and caused her at length to let go. The hawk, however, immediately gave chase to her assailant, and at the second stoop brought it also to the ground.

† I have elsewhere referred to a letter from Sir Edmund Bedingfeld to Lord Bath, dated in 1548, and printed in Gage's 'History of Hengrave,' which shows very clearly with what disfavour the introduction of game and wildfowl shooting was regarded by falconers. Trans. Norf. and Norw. Nat. Soc., vol. iii., pp. 81, 82.

It would not be difficult, did space here permit, to fill up the intervening gap in the history of Falconry in England, between the period to which I refer and the present time, and an interesting account might be given of the principal hawking establishments which have been maintained in the United Kingdom during the past and present centuries.

On hawking in Scotland and in Ireland two separate chapters might be written; while to give a sketch of the English poets, dramatists, and novelists who have described or touched upon hawking, and to criticise the knowledge of the subject displayed by them, would necessitate the preparation of a moderate-sized volume.

I must reluctantly leave untouched these branches of the subject, and come to the practical part of my discourse, which is to give some account of the various hawks employed by falconers; to point out the particular respects in which hawks and falcons differ; to describe the mode in which they are captured, tamed, and trained; and to indicate the particular "quarry" (as it is termed) or prey which each is flown at. Above all, bearing in mind the object of the course of lectures now in progress, I shall endeavour to show how much practical instruction may be gained upon the subject under discussion by a careful examination and comparison of the hawks and falcons now living in the Zoological Society's Gardens.

It is hardly necessary to observe that the birds under consideration all belong to the order *Accipitres*, or Birds of Prey, an order which may be regarded as the most natural in the system, because it is founded not upon a single character, but upon the general habit of the birds, in the formation of which all their leading organisations bear a part. It seems natural that the *Accipitres* should stand at the head of any system of ornithological classification, because *wings* are the grand characteristics of birds which especially distinguish them from all other vertebrated animals, and therefore those species in which the organs of flight are most highly developed may be regarded as the most typical of their class.

All birds of prey have certain characters in common which distinguish them as an order from other birds, namely, a powerful curved beak, with the upper mandible, in the most typical species, deeply notched, and therefore well adapted for seizing and cutting up the prey; strong feet and toes, with long, curved, sharp talons for striking the prey and firmly holding it; and a specialised form of sternum or breast-bone with a deep keel for the attachment of the pectoral muscles which move the wings, and give these birds that superior power of flight which excites the wonder and admiration of all who witness it. In nearly all the species the female is larger than the male, and consequently more powerful.

The present occasion does not admit of my discussing at any length the different systems of classification which have been proposed for the birds of prey, nor of describing in detail the various modifications of structure observable in the very numerous species which are included in this order. But inasmuch as the species which are capable of being trained and employed for hawking form but a small proportion of the birds of prey, it is desirable to comprehend at the outset the position which they occupy in relation to the remaining species in the order. This will be best understood by glancing at the following tables.

Until a comparatively recent date, the order *Accipitres* was generally divided into the families *Vulturidæ*, or Vultures, characterised by their naked heads, terrestrial and sluggish habits, and predilection for carrion; *Falconidæ*, or Falcons, Hawks, Eagles, and other diurnal birds of prey, distinguished by their feathered heads, great speed upon the wing, and eminently predatory habits; and *Strigidæ*, or Owls, characterised by having the eyes directed forward instead of laterally, and by their nocturnal habits. It has been pointed out, however, by Professor Huxley, in a paper published in the 'Proceedings' of this Society (1867), that the so-called family *Vulturidæ* was an unnatural association of members of two very distinct families, *viz.*, the *Cathartidæ*, or American Vultures, on the one hand, and a group of the *Falconidæ* (the Old World Vultures), on the other. He has also shown that the Secretary-bird (*Serpentarius reptilivorus*), previously included amongst the *Falconidæ*, is in reality the sole representative of a very distinct family which he has named *Gypogeranidæ*, but which might with more simplicity have been termed *Serpentariidæ*.

He would accordingly refer the typical members of the old so-called family *Vulturidæ* to the *Falconidæ*, and divide the diurnal birds of prey into the (1) *Cathartidæ*, American Vultures, (2) *Gypaetidæ*, which I should prefer to call *Falconidæ*, including the Falcons, Hawks, Eagles, and Old World Vultures, and (3) *Gypogeranidæ* (or as I would term it *Serpentariidæ*), to include the Secretary-bird.

On the present occasion we have only to deal with the second of these families (which, as I have said, I should prefer to call *Falconidæ*), and we may, therefore, dismiss the others at present from consideration.

As regards the subdivision of this family into "groups" or "subfamilies," opinions differ, and it is unnecessary on the present occasion to discuss the various views which have been expressed. On this point the student may be referred to Professor Huxley's paper, already mentioned; to Messrs. Sclater and Salvin's "Nomenclator Avium Neotropicalium"; Mr. Sharpe's "Catalogue of the *Accipitres* in the British Museum," with Mr. Gurney's valuable comments thereon in 'The Ibis'; Mr. Robert Ridgway's outlines of a natural arrangement of the *Falconidæ*;* and Professor Newton's article on the genus *Falco*, in the 'Encyclopædia Britannica.'

For our present purpose it will be most convenient to adopt the subdivision employed by Mr. Sclater in his "List of the Vertebrated Animals" in the gardens of this Society. This will obviate confusion, and will enable any visitor, with the "List" in his hand, to apply the remarks I have to offer.

Order ACCIPITRES.

Family FALCONIDÆ.

Subfamily.	Genus.	English Name.
I. Pandioninæ	Pandion	Osprey.
II. Circinæ	Circus	Harriers.
III. Buteoninæ	Buteo	Buzzards.
"	Archibuteo	
"	Pernis	
"	Haliastur	Brahminy Kite.
"	Urubitinga	Urubitinga.
"	Geranoaetus	Chilian Sea Eagle.

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* 'Bull. U. S. Geol. and Geogr. Survey of the Territories,' second series, No. 4 (1875).

Subfamily.	Genus.	English Name.
III. Buteoninæ	Harpyhaliaetus	Harpies.
,, (*continued*)	Thrasaetus	
,,	Helotarsus	Bateleur Eagle.
,,	Haliaetus	Sea Eagles.
,,	**Aquila**	Typical Eagles.
,,	Nisaetus	Booted and Bonelli's Eagles.
,,	Spizaetus	Crested Hawk Eagles.
,,	Circaetus	Short-toed Eagle.
,,	Spilornis	Cheela and Bacha Eagles (India and Java).
IV. Accipitrinæ	**Accipiter**	Sparrow-hawks.
,,	Melierax	African Zoned Hawks.
,,	**Astur**	Goshawks.
V. Falconinæ	**Falco**	Typical Falcons.
,,	**Hypotriorchis**	Hobbies
,,	Hieracidea	Berigora Falcons (Australia and New Zealand).
,,	**Tinnunculus**	Kestrels.
VI. Milvinæ	**Milvus**	Kites.
,,	Baza	Crested Black Kite.
,,	Elanus	Swallow-tailed Kites.
VII. Herpetotherinæ	Herpetotheres	Laughing Falcon (Brazil).
VIII. Polyborinæ	Polyborus	Brazilian Caracara.
,,	Milvago	South American Kites.
IX. Vulturinæ	Vultur	Typical Vultures.
,,	Gyps	Griffons.
,,	Neophron	White Scavenger Vultures.
X. Gypohieracinæ	Gypohierax	Angolan Vulture.
XI. Gypaetinæ	Gypaetus	Lammergeier.

On looking over this list (which has reference only to species now or formerly living in the Society's Gardens), it will be seen that the birds used by falconers are restricted to very few subfamilies.* I have marked the genus *Aquila*, because in Persia, Tartary, India, and other parts of the East, Eagles are said to be used for taking small deer, antelopes, and hares;† and there is some reason to believe that the Osprey has been trained to catch fish.‡ The Kite, although incapable of being trained, affords good sport when flown at by falcons, and so does the Kestrel. Falconers are in the habit of classifying the birds used by them as "Long-winged" and "Short-winged" Hawks, a very convenient division. To the first-named group belong all the typical

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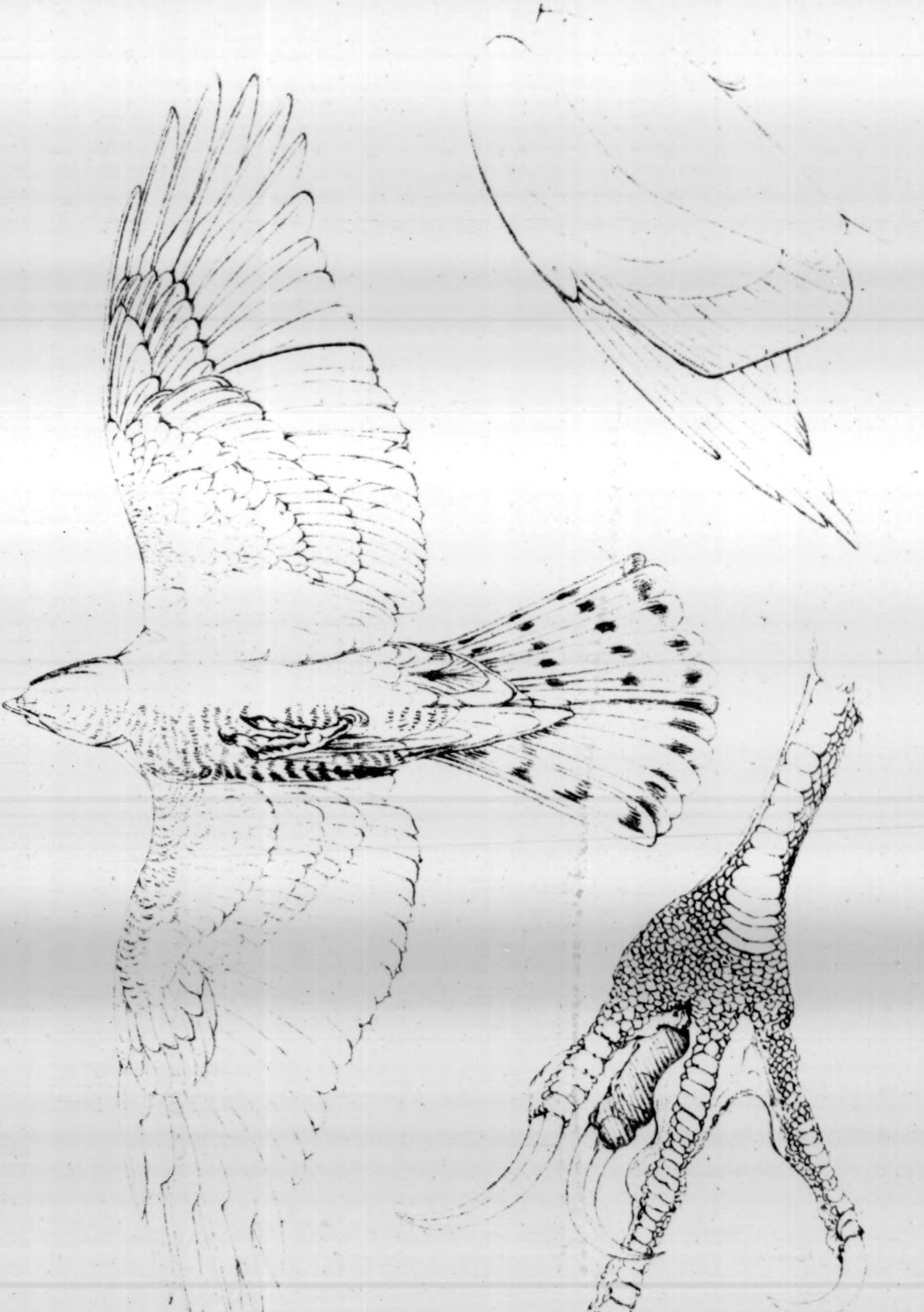
* These are printed in thicker type.

† See Sir J. Malcolm's 'Sketches of Persia'; Johnston's 'Sketches of Indian Field Sports'; Atkinson's 'Travels in Oriental and Western Siberia' and 'The Upper and Lower Amoor'; and Burton's 'Falconry in the Valley of the Indus.'

‡ See the Pell Records, pp. 219, 333.

Zool. Aug. 1880. Plate 3.



J. Wolf del. West, Newman & Co. lith.

Falcons (*Falco*), with the Hobby and Merlin and their allies (*Hypotriorchis*); the last-named comprises the Goshawks (*Astur*) and the Sparrow-hawks (*Accipiter*).

Grouping the species which have been living in the Gardens of this Society, we have the following summary, the various *habitats* being taken from Mr. Sclater's 'List':—

LONG-WINGED FALCONS.

Falco peregrinus. Europe.
„ biarmicus. South Africa.
„ barbarus. North Africa.
„ lanarius. Eastern Europe.
„ jugger. India.
„ sacer. Western Asia.
„ candicans. Greenland.
„ islandus. Iceland.
Hypotriorchis subbuteo. Europe.
„ vespertinus. South Europe.
„ eleonoræ. South Europe and North Africa.
„ æsalon. Europe.
„ columbarius. North America.
„ rufigularis. South America.

SHORT-WINGED HAWKS.

Astur palumbarius. Europe.
„ tibialis. West Africa.
„ approximans. Australia.
„ novæ-hollandiæ. Australia.
Accipiter nisus. Europe.
„ melanoleucus. Africa.

Hitherto I have been using the terms "Falcon" and "Hawk" indifferently, and, generally speaking, they are regarded as synonymous terms; but I may now take an opportunity of pointing out in what respects they differ, and how they may be always known apart. A falcon has long wings, reaching, when closed, to the end of the tail, which is comparatively short and square; short thighs and tarsi, comparatively robust toes with powerful claws; and always has a dark eye. A hawk, on the other hand, has short wings, which, when closed, do not reach nearly to the end of the tail, the latter long in proportion to that of a falcon, and rounded; long thighs and slender tarsi and toes; and invariably has a coloured eye, usually yellow or orange. The mode in which the two take their prey is very different. The long-winged falcon rises in circles until above the bird she is pursuing, and then, with half-closed wings, descends upon it with a "stoop," often from a considerable height. The short-winged hawk flies directly behind its prey, and, overtaking it by superior speed, either clutches it, or makes but a very short "stoop" to seize it. Falconers accordingly take advantage of this difference of habit, and select such "quarry" as each is capable of taking. The Peregrine will take Rooks, Crows and Magpies, Partridges, Grouse, Peewits, Curlews, and even Herons; the Jerfalcon used to be the hawk *par excellence* for Herons and Cranes; the Hobby and Merlin will take Larks well; the Goshawk is flown at Partridges, Pheasants, Wildfowl, and Rabbits; and the Sparrowhawk, which, although usually employed to catch Blackbirds and Thrushes, will (*i.e.*, the female bird will) kill Partridges like a Goshawk. In Syria it is commonly used for taking Quail.

Let us see now how these falcons and hawks are caught, and how they are tamed and trained. They may be either taken when fledged from the nest, or they may be caught after they have flown; and at any age. If taken from the nest they must be flown "at hack," as it is termed; that is to say, they must be allowed their liberty for a certain time, and fed regularly every day at the same place and at the same hour, until they are strong on the wing and able to kill "quarry" for themselves. They are then taken up, and the training commences. If caught "on passage," *i. e.*, while migrating in spring and autumn, they are treated in a different way, presently to be noticed.

In the autumn of 1877 I went to Holland for the purpose of learning the Dutch method of taking and training "passage hawks"; and an extremely interesting visit it was. As I have elsewhere described minutely what I saw,* it will only be necessary to observe here that the falconer, or rather the hawk-catcher, lies in wait for the hawks during the time they are migrating; that he attracts the attention of those passing over by means of a live pigeon, which is tethered close to a bow-net; and that the hawk, having seized the pigeon, is covered by the net, and taken alive and uninjured.

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* In the Falconry columns of 'The Field,' 16th Feb. and 16th March, 1878.

Timely warning of the approach of a hawk is given by a tame Butcher-bird (the Great Grey Shrike), which, tethered close to the falconer's hut, keeps a sharp look-out, and has so keen a vision that it can detect a hawk in the air long before the latter comes within the reach of human eyes.

On being taken out of the net, gently yet firmly *by the legs*, the hawk is immediately hooded, and has a "jess," or thin leather strap, put on each leg. To the other ends of these a "swivel" is attached, and through this again is passed the "leash," by which the bird is fastened, first to a "block" of turf, and eventually to a perch. Later on a bell is attached to one leg. The hood renders it quiet, the soft jesses confine it without hurting it, the turf block prevents any injury to wings and tail when it "bates," or flutters. It is fed once a day (in the evening); the hood is not removed, but, having a large opening in front, the bird is enabled to feed *through it* while held upon the glove. It is always carried upon the left hand for convenience of "hooding," "slipping," "feeding," &c., although eastern falconers carry it on the right. By degrees the bird gets tame, and will feed upon the hand without a hood. It is then taught to jump to the fist when called, and when it will do this readily the training commences, at first with a long string fastened to the swivel (instead of the leash), and ultimately the string is dispensed with. The hawk is always flown fasting, and on one or two days before going out for the first time it is desirable to give the hawk a live bird of the kind which it is intended to fly at, so as to accustom it to its appearance, and give it confidence. On days when it cannot be flown at live "quarry" it may be exercised by being flown to the lure, a dead pigeon (or pair of wings weighted) tied at the end of a long string and whirled in the air by the falconer. Should a flight feather become broken, or injured, it is easily repaired by a process called "imping," a description of which will be found in any book on Falconry.*

I have said that hawks should be fed once a day, and it is best to accustom them to be fed in the afternoon. Peregrines and the larger falcons should have lean beef or bullock's heart

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* Let me here recommend, as the best modern work on the subject, Salvin and Brodrick's 'Falconry in the British Islands,' royal octavo, published by Van Voorst. It is full of useful information, and contains coloured plates of the hawks admirably drawn from living specimens by Mr. Brodrick.

(about a third of a pound), and about every third day a pigeon or other bird for the sake of the feathers, which are essential from time to time to keep a hawk in health. All birds of prey, and some others, as Shrikes, Flycatchers, and Rooks, are in the habit of rejecting the indigestible portions of their food in the shape of pellets, called "castings." From the appearance of these the bird's condition may be judged. Hobbies, Merlins, and Sparrowhawks should, if possible, be fed on small birds and mice, or sheep's heart. Beef is too stimulating, and not easily digested by them.

It is of course impossible, within the narrow limits of a lecture like the present, to give expression to half the thoughts which crowd upon the mind in connection with the subject. I should like to have supplied some additional historical notices of Falconry in England, and to have described some of the "flights" I have witnessed with the Peregrine, Jerfalcon, Merlin, and Sparrowhawk; but time will not permit. I can only add that I trust my remarks concerning hawks may be regarded *as a plea in their favour*. They are useful to us in many ways. They are "Nature's police"; they keep down many birds, which, if allowed to become too numerous, might endanger our crops (for example, the natural prey of the Peregrine is the wild Pigeon); and they prevent a district from becoming overstocked with game, which is almost as prejudicial, in the eyes of a sportsman, as holding too little. They are capable of providing us with much amusement in the way of taming, training, and flying them; they are highly intelligent, and, if properly managed, become most gentle and docile. If gentlemen would only request their keepers to *catch* instead of *shoot* hawks (that is, assuming the liberty of these birds must be restrained), and try their hands at training them, I feel satisfied that they would derive a pleasure from the experiment far beyond their expectations.

A GERMAN VIEW OF THE FAUNA OF IRELAND.

By Ernst Friedel.*

I. Dublin, the East End; Phœnix Park and the Zoological Gardens.

The Phœnix Park is to Dublin what the Prater is to Vienna, or the Thiergarten to Berlin. Clement, in his 'Reisen in Irland' (Kiel, 1845), observes, "Dublin may well boast of her Phœnix Park, for there is no other in Europe to compare with it, combining as it does in its great extent extreme beauty, picturesque views, variety and undulation, and an abundance of different objects of interest." Situated on the Liffey to the west of the capital, it contains 1750 acres and has a circumference of seven English miles. Its beautiful clumps of old trees are surrounded, after the English fashion, by far-spreading grassy lawns, whose verdure, owing to the mild, damp climate of the Emerald Isle, surpasses even that of the English parks. Whole herds of cattle may be seen grazing undisturbed; for the custom of stocking the park-lands with fine cattle prevails here as in England, Holland, Belgium, and the North of France; a custom which might well be adopted in Germany also. It encourages cattle-breeding, and makes good use of the grass; while visitors, especially children, are thankful for the opportunity of a drink of fresh milk, at a small charge. Farther on I saw herds of Fallow Deer, which are very tame. The Red Deer are not much kept in Irish parks, for they soon get wild and even dangerous when only half-domesticated. The Fallow Deer is considered to have been introduced into Ireland; and this may be connected with the fact that here, as in Germany, it proves delicate, and is often subject to epidemics and great mortality after wet, cold winters. It is true that remains of the Fallow Deer have once been found at a considerable depth in a bog in Co. Antrim (as in a similar case they have been found in marl near Potsdam), but old Roman coins, modern buttons, flint implements, &c., may also be found in Irish bogs, and nothing is proved by the discovery of the remains of a single deer.

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* "Thierleben und Thierpflegen in Irland. Reisebemerkungen von Ernst Friedel in Berlin." 'Der Zoologische Garten,' Jahrgang xix. 271—277, 366—375; xx. 144—149, 270—275, 309—314.

The name Phœnix Park has no reference to Zoology. True the Viceroy, Lord Chesterfield, in 1745, erected in the park, at his own expense, a column thirty feet high, with the mythical bird on its summit flapping its wings over the flames; but Lord Chesterfield was a foreigner, a "Sassenach," who had only lived eight months in the country, and did not know that the real name was *fion-whiskey*, i. e. "clear-water," from a much-frequented chalybeate spring.

Not far from this is the Zoological Garden, commonly called "the Zoo"; for although Irishmen have a greater gift of speech than Englishmen, they have in this case adopted their neighbour's short and convenient expression. The gardens, which are spacious, well-grown, and well-watered, were opened, I believe, on May 10th, 1830, thus being one of the oldest of modern institutions of the kind. As may therefore be supposed, they are burdened with the usual defects of old gardens; besides which the damp climate is injurious to both wood and mortar, making Ireland a land of ruins. The trees grow with wonderful luxuriance; the ivy is beyond description; the country is a paradise of ferns and other cryptogams; one holly stem (*Ilex aquifolium*) measured 20 centimetres in diameter. This luxuriant vegetation causes more shade and humidity than some tropical animals can bear. Hence the larger animals, as in the old London and Paris Gardens, are allowed no out-door exercise. It would be unfair, however, to deny that at the date of my visit preparations were being made for an improvement in this respect. May they be continued—not abandoned after the first attempt, as is so often the case with Irish projects.*

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The Aquarium was in better condition—in fact, quite satisfactory. It is in a particularly roomy house, and contains both salt and fresh-water tanks. It forms a long right angle, and right and left against the walls are four smaller tanks; to the left three low open tanks, into which one can look down, and to the right one large open one, with the smaller tanks against the farther wall; while in the middle of the room is an isolated aquarium, which can be inspected from all sides. The Aquarium is constructed on Lloyd's system (not Brehm's grotto plan), and has succeeded well for many years.

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* Here follows an account of the animals observed in the Dublin Zoological Gardens, which, being probably well known to most of our readers, may be here omitted. The writer considered that more attention might be paid to the condition of the animals and to the cleanliness of the cages.—Ed.

Notwithstanding the length of time they have been made, the tanks look well. Those on each side of the entrance are filled with fresh water and protected from the light, so as to prevent the formation of *Algæ*, which is so destructive. Amongst the animals in the tanks I noticed the Pearl Mussel (*Unio margaritifer*), which is found in many counties of Ireland, as Cork, Waterford, Donegal, Tyrone, Antrim, Wicklow, &c. It is said that in the year 1839 such immense quantities of mussels were fished up at Omagh, County Tyrone, that the country people crushed them and used them as manure. No particular profit seems to be derived from the pearls. The specimens in the Dublin Aquarium have been living there since April, 1872, thus proving how well the water is cared for, since *Unios* do not usually live long in aquaria.

I was struck by the thousands of Minnows (*Leuciscus phoxinus*), the more so as this fish has only of late years been introduced into Ireland, and is as yet only found in the rivers of Dublin and Wicklow. The same with the Carp, which is not indigenous there any more than it is in England and Scotland, and is still so rare, or so little known, in Ireland that Thompson, in his 'Natural History of Ireland,' has carefully noted each locality. The true reason for this may be that in an island like Ireland, well supplied with every variety of sea-fish, including the finest *Salmonidæ*, fresh-water fish are but little valued, and seldom caught or eaten. I have found the like in England, Scotland, and on the sea-board of North America. The Barbel, so well known to Thames anglers, is not found in Ireland. Dr. P. Browne's Catalogue, which mentions it, without citing proof, as having been observed in 1744, is utterly untrustworthy. Farther on I noticed a Tench, which fish is said to have been introduced here, as in Great Britain. Also *Cobitis tænia* and *C. barbatula*: *C. fossilis*, on the contrary, is missing here, as it is all through the island. *Gasterosteus aculeatus* and *G. leiurus* were observed. The Ten-spined Stickleback (*G. pungitius*), found in Massachusetts, North America, is only local in Ireland, as with us, but is there in great numbers, and in the merest puddles. I was also interested in the Bull-frog (*Rana mugiens*), from Nova Scotia.

Associated with the Gasteropods were Cray-fish (*Astacus fluviatilis*), also introduced into Ireland, probably towards the end of the last century, and therefore by no means generally distributed, though common in certain places. Amongst the Mollusca I noticed a very large *Pinna ingens*, from the west coast of Ireland, and various kinds of Plaice, Burbot, Bream, &c. The Asteroids included fine specimens of *Anthea cereus*, Johnst., the beautiful *Adamsia maculata*, Johnst., *Actinia mesembryanthemum*, Ellis, *A. coccinia*, Müll., *Zealia crassicornis*, &c.

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The Dublin Fish Market was not so well stocked as I expected. Many shell-fish are eaten; besides oysters, there are the large *Cardium*, *Pholas*, *Mya*, *Mytilus*, *Patella*, *Litorina*, *Fusus*, *Buccinium*. The mussels are eaten raw, the whelks cooked.

Very remarkable bird-cages are used here. The actual cage forms a mill-wheel of trellis-work, which is fastened on a semicircle of wire, and turns round like our squirrels' wheels when the bird hops on to the step. A tin boat with flags is fastened under the wheel, so that the whole reminds one of a miniature steamboat. Little cages with movable wheels, like the squirrel-cages already mentioned, are also used here for white mice.

(To be continued.)

OCCASIONAL NOTES.

Great Bustard in Essex.—I have only lately seen the last few numbers of 'The Zoologist,' and write to say that Mr. Harting is perfectly correct in stating (p. 144) that the bird referred to by Mr. Travis is the same as Mr. Smoothy's specimen. To speak more correctly, however, I believe the locality should be close to Hull Bridge, on the River Crouch, at Woodham Ferrers. This is the only bird actually shot in the county that I have seen; but at the meeting of the Essex Naturalists' Club at which my paper was read, Mr. Fitch is reported to have said that he had "heard of two other specimens in Essex this winter, one at Manningtree and one at Maldon." I have been unable to obtain particulars of these, and have nowhere seen their capture recorded. It is very desirable that some further information should be obtained. I have had the pleasure of examining both the Woodham and the West Wickham specimens. They are both females, and very closely resemble one another, the only difference being in the intensity of some of the colours, in which I think the former had slightly the advantage.—R. M. CHRISTY (Saffron Walden).

ORNITHOLOGICAL NOTES FROM ORKNEY.—Between May 18th and June 14th the following birds were observed by me in Orkney:—Several Marsh Harriers, which were very wary; their cry is peculiar, something like that of a Peacock, uttered in a higher key and slower; some of their eggs found by the boys on the moors were quite fresh. The Wheatear was very common: most of them were sitting, but some had young ones. Of the Common Wren and Pied Wagtail I saw but few. Several Meadow Pipits were observed and nests found, some with young, and some with fresh-laid eggs; but this bird is nowhere numerous in Orkney. The Rock Pipit, on the other hand, is common by the sea on the steep cliffs, where it builds; I found three nests, one with five eggs quite fresh, the others with young ones. The Sky Lark and the Common Bunting are everywhere abundant; the latter might be seen by every farmstead or cottage; it is called "Throstle-cock" by the natives, and does not build till June. The Yellow Bunting was occasionally seen, as also the Linnet. The Twite was common: I found several nests with young or with eggs hard-sat; they were built in heather, especially among the cliffs near the sea. The House Sparrow was as common in Orkney as elsewhere. I saw several Hooded Crows and a few Rooks' nests at Kirkwall. The Cuckoo was once heard. The Rock Dove breeds in the cliffs. The Golden Plover was common, and at the date of my visit sitting. The Lapwing was everywhere abundant, and the young hatched. The Ringed Plover was equally abundant, breeding by the sides of lochs and tarns in gravelly places, sometimes at some distance from water in stony paths, but making no nest; the eggs were just hatching. The Redshank was very common, and just hatching; it breeds in tufts of grass in waste places on the moors: the old birds were very noisy. The Common Sandpiper did not seem to be very common: I found one nest at the bottom of a stone wall on a small island; the eggs were quite fresh on May 25th. The Dunlin was common enough, breeding generally near water in heather or grass: the eggs were fresh about May 17th. I found a few nests with fresh eggs of the Common Snipe. The Curlew, Landrail, Moorhen, Coot, and Wild Duck were all observed: the last named had fresh eggs. I saw several Widgeon, and found several nests of the Eider Duck in heather near the sea; the eggs fresh, and the nests contained a quantity of down. Gulls, as might be supposed, were very numerous. There are but few trees on the island, which may account for the scarcity of Thrushes and Blackbirds. I did not hear a Warbler or see either a Swallow or Robin.—H. G. TOMLINSON (The Woodlands, Burton-on-Trent).

CUCKOO DENUDED OF FEATHERS.—In Mr. Kermode's note (p. 257) on the Cuckoo found in the Isle of Man, the extent to which that bird was denuded of feathers is not recorded. I have frequently noticed that when a Cuckoo is shot and falls from the height of a few feet it loses nearly all the feathers from the back and upper tail-coverts, and sometimes also from the breast and sides. These feathers are very stiff and but slightly fixed in a very thin papery skin, so that a sudden blow or shock separates them easily from the skin. I have seen this happen even when the bird fell on a grassy meadow, and can imagine that if a Cuckoo was knocked down from a considerable height, either by shot or by a blow from a hawk, and fell on hard ground or on a hard peat-stack (as in the Isle of Man) the bird might be found much more denuded than those which I have seen. This easy separation of feathers from the Cuckoo makes it a very difficult bird to stuff, or even to make into a good skin. The Nightjar is much the same in this respect, but is too light a weight in proportion to its size to lose so many feathers on falling. Ring Doves on falling from a great height are apt to lose many feathers from the upper tail-coverts and flanks; but I have noticed this loss to a much greater extent and more invariably in the Cuckoo than in any other bird.—FRANK NORGATE (Sparham, Norwich).

[See Willughby's 'Ornithology,' p. 98.—ED.]

BIRDS' FEATHERS COMING OFF IN WINTER.—Mr. Philip M. C. Kermode refers to Cuckoos denuded of feathers (p. 257), and asks "Has the like been observed of any other bird?" The only instance I can recall was one which Mr. Seebohm and I met with. On March 24th, 1875 (not the 14th, as stated in 'Annals and Mag. Nat. Hist.,' July, 1877, p. 124), I shot a Hawfinch, *Coccothraustes vulgaris*, in the German Cemetery at Archangel. Its feathers were so loose that they came off at a touch, and we could not preserve the specimen, which was unfortunate, as it was the only one ever recorded as occurring at Archangel. From my journal I find that no disease was apparent externally or on dissection. The bird had been feeding on rye or some grain picked up at the bottom of the windmills.—J. A. HARVIE BROWN (Dunipace House, Larbert, N.B.)

HOOPOE NEAR BASINGSTOKE.—On the morning of May 12th I was called to the window to look at an "odd bird," which was feeding on the Rectory lawn, and which I recognised as the Hoopoe, *Upupa epops*, whose barred plumage, orange breast, and orange crest, which it was raising, in alarm or defiance perhaps, at some Thrushes feeding at a respectful distance from it, made it a splendid object in the sunshine. My exclamations of astonishment and delight proved unfortunately too much for our strange visitor, who, to our great disappointment took flight, but only, as it turned out, to the precincts of the Manor House opposite, which it haunted for three days. During this time we were able, with the aid of a field-glass, to see a good deal of our *rara avis*, whose chief object during its stay seemed to be to provision for some further flight, judging from the rapidity with which it fed and the eagerness and pertinacity with which it returned to the lawn after every fresh alarm caused by the advances of its admirers. I hear that one was seen some few years ago also in this immediate neighbourhood. I have followed the striking note of this shy bird in vain for a mile or two over marshy meadows in the wilds of Pomerania, only to hear it calling more and more faintly in the distance; but "all things come to those who know how to wait," and here it arrives at our very door. In those regions it is called "Der Kuckuck sein Küster" (the Cuckoo's clerk), from its appearance a fortnight before the arrival of the Cuckoo, to announce, as they say, his coming.—M. CARROW (Dummer Rectory, Basingstoke).

HOOPOES IN SUSSEX AND KENT.—I saw one of these birds close to me on April 17th, just outside Stanmer Park, in Sussex. Another, which I saw in the flesh, was killed on or about the 16th, near Hurstpierpoint; and a third at Longfield, near Gravesend, on or about April 14th. Is not this full early for them? I saw three male and one female Grey-headed Wagtails, at Brighton, which had all been obtained on the outskirts of that town. They were in splendid plumage, and quite fresh. Also a Common Tern, shot on a pond at Crawley about the middle of April.—CLIFTON (Cobham, Kent.)

HOOPOE NEAR CHICHESTER.—On April 24th a specimen of the Hoopoe was on our lawn for several hours. I resisted entreaties to have it shot, and, as I hear it is still in the neighbourhood, I hope others will follow my example, for I think such rare birds ought to be protected.—CARRINGTON FRANCIS SIZER (St. Mary's, Great Bentley, Colchester).

[We quite agree with our correspondent's view, and should be glad to think that his example will be followed.—ED.]

UNUSUAL NEST OF EGGS OF THE WATERHEN.—During an excursion to Strensall Common last spring, I came across a nest of this bird containing twenty-six eggs, an extraordinary number, the usual complement being eight or nine, although I have occasionally found as many as eleven, and once twelve in one nest. The eggs were in three distinct batches: seven or eight were very similar, being of a warm stone colour, thickly marked with large, rich brown spots. Another lot were considerably smaller, and were very slightly freckled with dark red; while the third batch differed entirely from either of the preceding. I have specimens of all the three varieties in my collection. I think this is sufficient proof that three Waterhens must have laid their eggs in one nest—an instance which I think has never been known to occur before. It is not unusual to find Partridges and Pheasants laying their eggs together. The nest now referred to was as large as, and similar to, that of the Coot. It would be interesting to know whether the three birds took their share in incubation, or whether the original owner of the nest was left in charge of the whole twenty-six eggs. I have frequently found the Waterhen's nest in trees. Last year I found one containing eggs in a holly tree about twelve feet above the ground. I found another in a tree near the same place, which must have been upwards of forty feet above the ground. I have examined scores of Waterhens' eggs, and find that they do not differ much in their general appearance; but I once found a nest containing eggs which were beautifully streaked after the manner of a Bunting's egg.—Walter Raine (Leeds).

Black-winged Stilt near Eastbourne.—On May 6th, in the marshes between Eastbourne and Polegate, my attention was attracted to my fox-terrier, who was pursuing a large bird along a ditch, where the bird had evidently been feeding. It ran with long strides for a few yards, and then rose into the air and flew close past me, and at the height of about four feet only from the ground. I saw at once, by its great length of leg, black and white plumage, and flight, that it was a Stilt—certainly a scarce species nowadays in this country. The bird appeared very tired, as it only flew some two hundred yards, alighting in a deep ditch, amongst long rushes, whence I did not again dislodge it.—Alexander Clark Kennedy, late Coldstream Guards (Eastbourne).

"Wariangle" and "Nynmurder," names for the Butcher Bird.—With reference to the remarks which have appeared upon this subject (Zool. 1879, pp. 404, note, and 488), it may be observed that an explanation of both these names is given by Willughby, in his 'Ornithology' (p. 87). Under the head of "The Greater Butcher-bird or Mattagess," he writes:—"This bird in the North of England is called *Wierangle*, a name, it seems, common to us with the Germans, who (as Gesner witnesseth) about Strasburgh, Franckfort, and elsewhere, call it *Werkengel* or *Warkangel*, perchance (saith he) as it were *Wurchangel*, which literally rendered signifies 'a suffocating angel.' In other parts of Germany it is called *Neghen-doer*, that is 'Nine-killer' [*Enneoctonos*], because it kills nine birds before it ceases, or every day nine. Our falconers call it the *Mattagess*, a name borrowed from the Savoyards, which is by Aldrovandus interpreted 'a murdering pie.'" As regards the last-mentioned, compare the names cited by Rolland, 'Faune Populaire de la France' (Oiseaux), pp. 131, 132, 150, 151.—J. E. Harting.

Peregrine Falcons on Salisbury Cathedral Spire.—During the first week of May I saw several times a pair of these fine birds flying round the cathedral spire and perching upon its pinnacles. Their cries were constant and unmistakable, and attracted my attention the first time that

I came near the cathedral, though it was not until the next morning that I was gratified by seeing them. Every precaution has been taken, I understand, to prevent these birds being molested, so that we may confidently expect a brood to be hatched and reared there in due time.—O. PICKARD CAMBRIDGE (Bloxworth Rectory, Dorset).

UNUSUAL NESTING-PLACE OF THE WHEATEAR.—During an ornithological ramble to Adel last spring, I obtained eggs of a Wheatear from a hole in a bank which overhangs one of our beautiful streams. The hole was once the nesting-place of a Sand Martin. The nest was placed at the far end of the hole, which was about three feet in length. I know of only one other such instance on record—namely, that given by Hewitson, in his 'Eggs of British Birds.' At the same time I procured eggs of the Dipper from a boy who had found them near the same stream a few days previously. He discovered the old bird on the nest, and took bird, nest and five eggs. He kept the bird in a cage for some time, but being unable to obtain food for it he was persuaded to let it go, and not knowing the value of the nest, destroyed it. The Dipper's nest is seldom found in this neighbourhood.—WALTER RAINE (Leeds).

A STRANGE NESTING COMMUNITY.—In an elm tree in a hedgerow near Shoeburyness, in Essex, my friend Capt. W. Hubback, Royal Artillery, was shown the following most extraordinary collection of nests:—In a fork on one side of the tree was that of a Kestrel, containing six eggs, from which one of the old birds was dislodged; high up on the main stem a pair of Carrion Crows had made theirs, which held three eggs; and half-way up, among the small twigs against the trunk, the flimsy construction of the Ring Dove was placed, with two much incubated eggs. This was on the 6th May last. Why these widely-different species had all been attracted to this one particular tree is hard to imagine. There were hundreds of similar trees in the immediate vicinity, but no nests.—SAVILE J. REID, Capt. R.E. (Brompton Barracks, Chatham).

SNOW BUNTING AT CROMER IN MAY.—I was much surprised to see a Snow Bunting on the beach at Cromer on May 10th. It was flying about in company with a Sparrow, and appeared very tame indeed. Is not this an unusually late appearance of this bird?—CHARLES W. BENSON (Rathmines School, Dublin).

WOODCOCK BREEDING IN HERTFORDSHIRE.—It may be interesting to some of your readers to know that a nest of Woodcocks has safely come off on Hertford Heath, not two hundred yards from the College grounds. I had heard that the old bird with two or three young ones had been seen several times on the heath, and on the evening of May 25th had the pleasure of examining one of the young ones. It was nearly full grown, and could fly fairly well. Of course I let it go again. It is quite a wonder that the bird was not disturbed while sitting, as the heath is public, and is disturbed from morn till eve by boys in search of nests. I am quite aware that the Woodcock breeds in many counties in England, but do not know whether Hertfordshire has been added to the list.—M. VAUGHAN (Haileybury College).

WOODCOCK NESTING IN LANCASHIRE.—On May 20th, while walking in the outskirts of an extensive wood here, I was much surprised by seeing four Woodcocks rise from under some brushwood. One of them lingered an instant behind the rest, and gave me an opportunity of seeing that it was full grown and in complete plumage. I have heard from gamekeepers that nests have been occasionally found in this neighbourhood; but this date seems early for full-grown young birds.—JAMES MURTON (Highfield, Silverdale, near Carnforth).

CRESTED LARK IN CORNWALL.—On June 12th I shot a Crested Lark, *Alauda cristata*, in our garden, and have sent it to Mr. Vingoe, our Cornish naturalist, to be set up. He has advised me to send you this notice. He says the bird is a female, as he found eggs in the ovary.—HERBERT P. HART (Polbrean, Lizard, Helston).

[This makes the fifth instance in which the Crested Lark has been met with in Cornwall. Particulars of previous captures will be found in Rodd's 'Birds of Cornwall and the Scilly Isles,' p. 50.—ED.]

NATURAL-HISTORY NOTES FROM LERWICK.—There is nothing of special interest here at present to communicate in relation to Ornithology, except the fact that, owing to the mild weather during winter and early spring, the birds have nested earlier this year than usual. A pair of Ravens had their young out about the middle of April, in one instance under my own observation. The Great Black-backed Gull nested on the 1st of May in the lochs, as also several of the small gulls. A pair of Swallows were seen about here for some weeks prior to this date (May 26th), but no appearance of nesting as yet. An unusual quantity of Ducks visited us during the winter, but almost all left here by May 26th. I observed the first pair of Arctic Terns on the 22nd May, flying high and in an uneasy manner round the nesting site; they seemed to have just newly arrived from the north. I found a fine specimen of the Sea-mouse the other day on the beach of the loch Clickiwin, near Lerwick; it was quite fresh, and must have been newly carried there by a bird, who, finding it impossible to swallow such a rough morsel, had dropped it on the margin of the loch. The animal was four inches long, dusky grey on the back, studded with sharp bristles. The hair on the sides was of a brilliant green colour, tinged with yellow. I counted sixty four feet, but might have missed some of the smaller ones, as they diminish in size towards the tail. It is an inhabitant of deep water, and is sometimes found in the stomachs of cod caught far out at sea, which makes the finding of it on the shore of a fresh-water loch rather interesting.—J. T. GARRIOCK (Prospect House, Lerwick).

SCOMBER PUNCTATUS ON THE CORNISH COAST.—On the 21st of April I received from my kind friend Mr. Matthias Dunn, of Mevagissey, a beautiful and fresh example of Couch's "Dotted Mackarel," a most welcome addition to my collection of British fishes, as I have long been desirous of investigating the different species. Pennant (1776) and Fleming (1828) only record the "Common Mackarel" from the British Isles; Turton (1807) adds the "Spanish Mackarel," *Scomber colias*, which is also included by Jenyns (1835), Yarrell, White (1851), and Thompson (1856), the three last authors considering *Scomber maculatus*, Couch, the same as *S. colias*. Couch, however, recorded both the forms admitted by his predecessors, and also the "Dotted" and the "Scribbled" Mackarels. Dr. Günther, in his 'Catalogue of Fishes' (1860), places the "Dotted Mackarel," *Scomber punctatus*, as a doubtful species on which he offers no opinion, while Couch's *S. scriptus* had not been described at that time. Couch's example of "Dotted Mackarel" was a female, 15½ inches long, taken in Cornwall, July, 1848; it is said to have differed from the common form in that "the jaws were more decidedly of equal length," the sides and belly more distinctly scaled, no air-bladder. His "Scribbled Mackarel," of which he obtained three examples, were also deficient in air-bladders, while a rise was noted as existing at the snout and another at the occiput, and the lateral line was stated to be smooth, not zigzag. The chief difference seems to have been in the colours. It must be remarked that the "Spanish Mackarel" possesses an air-bladder, although Couch could not find it, while he likewise stated it to be absent both in his "Dotted" and "Scribbled" species. Sir John Richardson, when editing the third edition of Yarrell's 'British Fishes,' admitted the "Dotted Mackarel," but doubted if further anatomical investigation would or would not permit of its being retained as a distinct species. The example I have received is a female in which the ova are not quite ripe; it possesses twelve spines in its first, and one spine and eleven rays in its second, dorsal fin, and also five finlets; its anal has one spine, eleven rays, and five finlets—no air-bladder. Having no air-bladder, it cannot be the Spanish Mackarel or the Mediterranean *Scomber pneumatophorus*, leaving for consideration whether it may be a variety of the Common Mackarel. In the number of its rays and scales, and also in its proportions, it is identical with the Common Mackarel, except being slightly wider between the eyes. This, however, is liable to variation, as I have lately received two American examples from the Cambridge Museum, Massachusetts, in which I perceive the interorbital width intermediate between my British specimens and what I find in the "Dotted Mackarel," which is an interesting variety of the Common Mackarel. It is exceedingly fortunate that we have such an excellent observer on the coast as Mr. Dunn, and much to be regretted that those having similar opportunities at Brixham, and elsewhere, do not in like manner take notice of rarities as they occur.—Francis Day (Kenilworth House, Pittville, Cheltenham).

Food of Sea Fishes: Whiting and Whiting-pout.—The Whiting, *Merlangus vulgaris*, and the Whiting-pout, *Morrhua lusca*, although so closely allied in name, are in their habitat and feeding quite distinct, the former of which is considered the more delicate of the two, but whether it is on account of the food devoured by the latter, the flavour in my idea surpasses the Whiting proper, which is most decidedly very delicately flavoured, and out of many thousands that have been disembowelled by myself it has seldom occurred that I have come across any Crustacea enclosed therein, excepting in May, 1873. A Whiting of six pounds weight was forwarded to me from Teignmouth, in which I found a female Broad-tailed Lobster, *Scylurus arctus*, a perfect specimen, and very rare on this coast; and which can now be seen in the Albert Memorial Museum, along with a splendid male specimen which was taken by myself the following week from a codfish captured in Torbay. But as a rule the food of Whitings depends much upon the seasons, such as Sprats, Herrings, Pilchards, &c. At the present time (December) Sprats and Herrings (pieces of herring make most killing bait) is the principal substance contained in their maws. In the spring they contain a thick fluid resembling that taken from the Mount's Bay Mackarel when in season, which is very much like anchovy sauce; but what it is composed of I never could make out. I fancy it must be either shrimps or prawns. It is very destructive to the stomachs of those fish that partake of it, occasioning them to burst and become unsaleable in a very short time after leaving their native element. The Whiting-pout, Bib, Brassy, or as it is sometimes called the "Stink Alive," of all fish, for inspection gives the greatest variety of food and curios. I know these fish are great gourmands, excellent scavengers, and are found more among rocks and old wrecks, and the more unapproachable places for many other kinds of fish, the Wrasse, Dory, and Boar-fish excepted. The Whiting-pout has also a barbule, beard, or feeder, which the true Whiting has not; which proves to me that they live as a rule nearer the bottom of the ocean than the Whiting, which has no such appendage. Among the many kinds of substances found in the stomachs of these fish, I may call attention to the following Crustacea, which are really worth mentioning; most of them, like the above Broad-tailed Lobster, can be seen in the Albert Memorial Museum, Exeter, where I presented them with several of the following:—Montagu's Crab, *Xantho*

florida; Angled Crab, *Gonoplax Angulata;* Velvet Fiddler Crab, *Portunus depressa;* Hermit Crab, *Pagurus bernhardus;* Pea Crab, *Pinnotheres pisum;* Spider Crab, *Cancer pagurus; Stenorhynchus tenuirostris; Porcellanus longicornis;* Olive Squat Lobster, *Galathea squamifera; Stenorhynchus phalanguom; Eurynome aspersa; Xantho riolosa.*—FRANK GOSDEN, in 'Land and Water.'

THE FAUNA OF BELFAST LOUGH.—Mr. David Bogue has now at press and will shortly publish a work on the 'Birds, Fishes, and Cetacea of Belfast Lough,' by Mr. R. Lloyd Patterson, Vice-President of Belfast Natural History Society and President of Belfast Chamber of Commerce.

PROCEEDINGS OF SCIENTIFIC SOCIETIES.

ZOOLOGICAL SOCIETY OF LONDON.

June 1, 1880.—Professor W. H. FLOWER, LL.D., F.R.S., President, in the chair.

Mr. Sclater made some remarks on the principal objects he had noticed during a recent inspection of the Zoological Gardens of Berlin, Hamburg, Amsterdam, the Hague, and Antwerp.

The Secretary exhibited a spider of the genus *Tegenaria,* which had been forwarded to him from Cape Town, by Mr. J. H. Payne, of that place. It had been taken within three miles of Cape Town, on the back of a horse which had subsequently died, as it was said, from the effects of the bite.

Mr. G. E. Dobson exhibited some new and rare species of Bats, amongst which was an example of a new species of the genus *Megaderma,* from Australia, proposed to be called *Megaderma gigas,* and remarkable for its large size.

Mr. Dobson made some further remarks as to the date of the receipt of the Dodo bones exhibited by him at a former meeting.

Lord Lilford exhibited and made remarks on some nests and eggs of the Flamingo, which had been taken in the marshes of the Guadalquivir, below Seville, in April, 1879.

Lord Lilford also exhibited some fine Hybrid Pheasants, between males of Reeves' Pheasant and hens of the Common Pheasant.

Mr. E. W. H. Holdsworth read a note on the distribution of the Crayfish (*Astacus*) in Spain.

Prof. F. Jeffrey Bell read a paper on some species and genera of the *Temnopleuridæ,* in the course of which he described the method he had adopted in comparing different species, and species at different stages in growth. He also directed special attention to the differences in the size of the generation pores in *Amblypneustes formosus*, and discussed the specific characters of *Salmacis globator*.

A communication was read from Dr. A. Günther, containing notes on a collection of Mammals from Japan.

Mr. G. E. Dobson read a description of a new species of Bat, of the genus *Natalus*, from Jamaica, which he proposed to name *N. micropus*.

Mr. A. W. E. O'Shaughnessy read the description of a new species of Lizard of the genus *Uromastix*, from Zanzibar, which he proposed to call *U. princeps*.

June 15, 1880.—Professor W. H. Flower, LL.D., F.R.S., President, in the chair.

The Secretary read a report on the additions that had been made to the Society's Menagerie during the month of May, 1810, and called special attention to several novelties, amongst which were:—Two Side-striped Jackals, *Canis lateralis*, acquired by purchase May 28th. Only one example of this rare species had been previously received by the Society. A young male Luhdorf's Deer, *Cervus Luhdorfi*, born in the Zoological Gardens of Hamburg, and new to the collection. Luhdorf's Deer is a newly discovered species, allied to the Wapiti, from Amoorland.

The Secretary exhibited the skin of an Antelope received from the Gaboon, and remarked that it appeared to belong to the female of an undescribed species of *Tragelaphus*, allied to *Tragelaphus Spekii*, which he proposed to name *T. gratus*.

Dr. A. Günther exhibited and made remarks on a series of horns of the Sambur Deer of Borneo.

Mr. W. T. Blanford made some remarks on the proper name of the Himalayan Marmots, now living in the Society's Gardens, which he believed to be *Arctomys Hodgsoni*.

Professor Mivart called attention to the fresh-water *Medusæ*, now living in the Victoria Lily House, in the Botanic Gardens, Regent's Park.

Mr. Edward R. Alston read a paper "On *Antechinomys* and its Allies," in which he described the anatomy of that little-known Marsupial. He regarded the four genera *Phascologale*, *Antechinus*, *Podabrus*, and *Antechinomys*, as constituting a subfamily of the *Dasyuridæ*, the first and the second, and the third and fourth, being most nearly related to one another.

Mr. G. E. Dobson read a paper on some new or rare species of Chiroptera in the collection of the Göttingen Museum. Amongst these was a new species of *Megaderma* from Australia, which, on account of its large size, Mr. Dobson prososed to name *Megaderma gigas*.

Mr. W. A. Forbes read a paper on the anatomy of *Leptosoma discolor*, and adduced further evidence to show that this bird is related, not to the Cuckoos (*Cuculidæ*), but to the Rollers (*Coraciidæ*).

A second paper by Mr. Forbes contained remarks on two rare Ploceine birds in the Society's collection (*Vidua splendens* and *Pytelia Wieneri*).

Mr. Forbes likewise read some notes on the anatomy of a male Denham's Bustard, lately living in the Society's Gardens, and on its mode of "showing off" when alive.

Mr. Edgar A. Smith read the descriptions of twelve new species of shells from various localities. Specimens of all but two were in the collection of the British Museum.

Sir Walter Elliot, K.C.S.I., read some notes on the Indian Bustard, and its manner of "showing off," as observed by him in India.

Mr. F. H. Waterhouse read a list of the dates of publication of the several parts of Sir Andrew Smith's 'Illustrations of the Zoology of South Africa.'

Mr. A. W. E. O'Shaugnessy read the description of a new species of Lizard of the genus *Anolis*, from Ecuador, which he proposed to call *Anolis Buckleyi*, after its discoverer, Mr. Clarence Buckley.

Mr. Sclater read a paper containing a list of the certainly-known species of *Anatidæ*, with notes on such as have been introduced into the Zoological Gardens of Europe.

Mr. William Powell read some notes on the habits of the Mooruk, *Casuarius Bennetti*, of New Britain.

This meeting closes the present session. There will be no more scientific meetings until the commencement of the session 1880-81, in November next.—P. L. SCLATER, *Secretary*.

ENTOMOLOGICAL SOCIETY OF LONDON.

June 2, 1880.—Sir JOHN LUBBOCK, Bart., M.P., F.R.S., &c., President, in the chair.

Miss Georgiana Ormerod, of Dunster Lodge, Spring Grove, Isleworth, and Mr. Henry Lupton, of the Elms, Chapel Allerton, Leeds, were ballotted for and elected Ordinary Members.

Mr. M. J. Walhouse exhibited a collection of moths from Mangalore, on the Malabar coast, India. Many of the species showed a great resemblance to European forms.

Mr. J. A. Finzi exhibited, on behalf of Mr. Lowrey, a bred specimen of *Arctia fuliginosa*, with only one antenna.

Sir John Lubbock stated that he had occasionally bred ants with only one antenna, and on one occasion had possessed a specimen with no antennæ at all, this individual being completely helpless when out of the nest.

The President also exhibited specimens of a new Australian ant which he had received from Mr. Waller, and which agreed with the remarkable genus *Myrmecocystus* of Wesmael in having an immensely distended abdomen, so that the insect actually serves as an animated honey-pot. The present species, however, belongs to a different genus, and is allied to *Camponotus*.

The Rev. H. S. Gorham communicated the concluding portion of his "Materials for a Revision of the *Lampyridæ*."—R. MELDOLA, *Hon. Sec.*

NOTICES OF NEW BOOKS.

A History of the British Marine Polyzoa. By the REV. THOMAS HINCKS, B.A., F.R.S. 2 vols., 8vo. J. Van Voorst. 1880.

THIS volume, which has been expected for some time, will be welcomed by those interested in the study of this group, and workers will now find their labours much lessened, for the literature on the British Bryozoa, being widely scattered in various periodicals, has made the study very laborious. The book which up to the present time has been used in the determination of species has been Busk's British Museum catalogue, but since this was published, many new species have been discovered in the British seas, and several important works on recent forms from European and American waters have appeared; besides which great advances in the physiology and embryology have been made by Smitt, Nitsch, Joliet, aud Barrois, and therefore a first class manual like the one before us should attract many workers, where it will be seen there is still much to be done.

The introduction of one hundred and thirty-five pages gives an elaborate and full account of the structure and physiology, and is thoroughly scientific in giving the results obtained by others with great fairness. Those who have seen Mr. Hincks's previous papers will not be surprised to find so good a worker boldly acknowledging a change of opinion when that which he previously advocated has, upon wider study, proved incorrect (as is the case with the so-called "colonial nervous system" or endosarc); and again, the account of the so-called "brown bodies" fairly represents the changes that have taken place since he first took part in the discussion respecting them.

The Bryozoa, with the exception of *Loxosoma*, occur as colonies, in which each Bryozoon consists of the zoœcium or "chamber," in which the polypide is lodged. In a colony a large number of zoœcia are without polypides, as the life of the polypide is often short, whereas the colony may have a very long life. When a polypide disappears, it is replaced by a "brown body," and this has given rise to much discussion and a large amount of published speculation.

It is now, however, universally recognised that it is derived from the polypide, and is the result of its decline; but Mr. Hincks has some hesitation in following Joliet in his opinion that this brown body is without reproductive function, and, although the evidence against this is very strong, lays much stress on the fact that the second crop of polypides, where developed from the brown body, have at first a reddish brown colour, which is wanting in the polypides of young marginal cells.

Much discussion has also arisen concerning another tissue, now called the endosarc, shown to be derived from the endocyst, and which is seen under various forms, sometimes most clearly as the "funiculus," attached to the base of the stomach of the polypide and passing down to the bottom of the cell.

In some, as *Zoobotryon pellucidus,* the endosarc passes as a connective cord along the stolon, and gives off a branch to each polypide; in others it is seen near the back or dorsal surface of the zoœcium, extending down its walls, and in contact with each of the "communication-plates," showing in several respects great variation according to the mode of growth of the species. Müller, Smitt, Clararéde, Hincks—all adopted the view that this was a colonial nervous system; but Joliet clearly demonstrated the incorrectness of this interpretation, and Mr. Hincks now recognises the value of Joliet's evidence.

We do not think Mr. Hincks has been fortunate in his choice of woodcuts to illustrate this point, for Reichert's figures must be looked upon as incorrect diagramatic elaborations, and fig. xv. (which is unconsciously somewhat improved) is probably taken from *Zoobotryon* in an abnormal, perhaps we may say enfeebled, condition; nor is it one of Reichert's most characteristic figures.

Probably it will be found that the above remarks apply to most of the figures which have appeared of *Zoobotryon*, and instead of one thick cord a large number of thin threads, placed together as a bundle, and frequently anastomosing, should be represented. In other species, where the endosarcal cord appears more solid than in *Zoobotryon*, careful examination will sometimes show that it consists of various threads. On the funiculus, which is a part of the endosarc, the spermary is developed, and also, in a large proportion of cases if not universally, both the ovary and polypide.

Mr. Hincks devotes some space to a discussion of Joliet's views on this question, and to observations made prior to Joliet's discovery, some of which, he considers, render further examination necessary in a large number of species. This structure must now be considered of primary importance.

Mr. Hincks has adopted a much modified classification, which will certainly be hailed as a great improvement on the previous arrangement of the British forms. The first attempt at a general classification was made by d'Orbigny, and the plan was undoubtedly very good; but it was badly worked out, and genera and species were manufactured wholesale, often on very insufficient grounds, and, on account of the great difficulty thus needlessly introduced by d'Orbigny, his system has received less attention than it deserves. The mode of growth was not made a family characteristic, but in the generic divisions he often indicated the manner in which a colony grew by an affix or suffix; thus he had *Flustra*, *Flustrella*, *Flustrellaria*, *Flustrina*, *Reptoflustra*, and nine other genera derived from *Flustra*; and on mastering one group we recognise the mode of growth from the name, as *Eschara*, *Repteschareella*, *Semieschara*; *Eschara* being erect, and consisting of two layers; *Reptescharella* adnate, and *Semieschara* consisting of only one layer. In most groups of animals such an arrangement would have little to recommend it; but in Bryozoa, whatever characters are taken for classification, forms with many common characters crop up in widely divergent genera; in fact, we may say the genera form an anastomosing network in any classification at present possible.

Johnstone employed a simple classification, which Busk somewhat modified when he wrote his Catalogue of the Polyzoa in the British Museum, and undertook the investigation of the Cray Polyzoa. In these the grouping is based principally upon the mode of growth; so that, for instance, a vast variety of forms with little in common, except the fact that they were incrusted on stones or seaweeds, were classed as *Lepralia*. We must not, however, forget that, most unsatisfactory and unscientific as this classification is now seen to be, Busk's descriptions were extremely clear; and these have enabled specialists to use them as indices and become acquainted with their characters, and thus collect material for a more natural classification.

Some time after the publication of Busk's works, Smitt introduced a new classification, based mostly on the form of the zoœcium, and using largely the shape of the oral aperture. This was applied to the northern Bryozoa, and also to those from Florida, and a new era was inaugurated; but the difficulties of the subject are so great, that in many cases the too rigid carrying out of his plan gives unsatisfactory results. But any classification must comprehend much of Smitt's, and we now have one modified by Mr. Hincks, or rather, we should say, we now see it carried out, and can better judge how it will work than we could from the preliminary notices which had already appeared in the 'Annals.' Of course most that is objectionable in the British Museum Catalogue is discarded, and the characters used are for the most part those employed by Smitt, the main difference being that Mr. Hincks makes much more use of the secondary aperture than had been done before; but in our opinion it seems probable that some modification may be required in some of the genera almost entirely based on the nature of the peristome; but should it be found in a few cases that this has only served as a means of cataloguing material, and is thus again a stepping-stone to further advances, it should not be forgotten that improved classification advances the science, and it may be many years before the addition of fresh material may render fresh changes necessary.

This is not the place for a critical examination of all the new or modified genera with which we have expressed general approval, but we must express regret that a genus which has been shifted about as much so *Cellularia*, and which might therefore be discarded altogether, has been retained (though in quite a different sense from that intended by Smitt, who employs it in a wider sense), and contains a large number of the genera included by Pallas (who created the genus), whereas, as Mr. Hincks points out, it does not, as now limited by Busk, include any of the forms placed by Pallas in the genus.

There are interesting chapters on the avicularia or "birds'-head processes"; on the reproduction and the affinities of the

Bryozoa; and on the name Polyzoa and Bryozoa, with which the writer of this notice does not agree, but as the reasons for dissent have been expressed elsewhere will not here introduce this question still *sub judice*.

After carefully examining with satisfaction a book written with so much care, and showing by the references that Mr. Hincks has not only a complete acquaintance with the English fauna, but also a large knowledge of the literature, it is with a feeling of disappointment that we find, before closing the volume, his "List of works on the Polyzoa" so unworthy of the rest; and it is difficult to understand on what principle it has been compiled, for important works mentioned in the text are omitted, and the references are incomplete. For instance, if we want Heller's paper on the Bryozoa of the Adriatic, we should imagine it was a separate work, and do not see that it appeared in the Proc. of the Zool. Bot. Verein of Vienna; nor would a beginner understand that when Ellis is referred to, that it is only his first book, and that the enlarged and more important work brought out in conjunction with Solander is not noticed. We refer to Hatschek's paper, and find only "Zeitschrift," which can hardly be considered sufficient, seeing there cannot be less than one hundred scientific journals called "Zeitschrift." Strange to say, this omission to particularize the Journal occurs many times. The reference to the papers of Milne-Edwards is incomplete, and those by Leidy and Dawson are referred to in the text, but not in the list. Again, if some of the works on tertiary fossils, as those of Reuss and Manzoni, are mentioned, we cannot see why the papers of Stoliczka and Gabb and Horn should not also have a place. Perhaps Mr. Hincks, knowing that several papers on the Australian and New Zealand Bryozoa have been written by authors almost wholly unacquainted with the group, thought it best to ignore them; but we do not agree in this, so long as they are quoted in the text, where, however, we should have been glad to know if Mr. Hincks had confirmed the authors' determination, since many are not to be relied on even for genera. On the whole, this book, with its excellent plates, does great credit both to the author and artist, as well as to the publisher, and we hope it will find the place it deserves in all zoological libraries.